

REMARKS

This case has been carefully reviewed in light of Office Action dated 20 April 2007. Claims 1-2, 4-6, 8-12 were rejected under 35 USC 103(a) as being unpatentable over Engeler US5566133, in view of Sumino JP56-157879 or Aratama JP61-296266, alone or further in view of Bartelt EP07662142 and applied to claims 5 and 6. Claim 3 was rejected under 35 USC 103(a) as being unpatentable over Engeler in view of Sumino or Aratama and further in view of Yakymyshyn et al. US5396362. Claim 7 was rejected under 35 USC 103(a) as being unpatentable over Engeler in view of Sumino or Aratama and further in view of Silwa US5560362. Claims 1-12 remain pending in this application. Applicant respectfully requests reconsideration of the application by the Examiner in light of the following remarks below.

Claims 1-2, 4-6, 8-12

Claims 1-2, 4-6, 8-12 were rejected under 35 USC 103(a) as being unpatentable over Engeler in view of Sumino or Aratama, alone or further in view of Bartelt.

Claims 1 and 10 recites:

1. An ultrasound system comprising:
an ultrasound probe comprising a plurality of transducer elements configured for sensing ultrasound signals and converting the ultrasound signals to analog electrical signals, the ultrasound probe configured for transmitting the analog electrical signals;
an optical conduit comprising an electro-optic modulator configured for
(a) receiving the analog electrical signals,
(b) receiving optical signals from a light source, and
(c) modulating the optical signals with the analog electrical signals;
wherein the optical conduit is configured for transmitting the modulated optical signals to an optical detector.

10. (Previously Presented) A method for generating an image, the method comprising:
sensing ultrasound signals,
converting the ultrasound signals to analog electrical signals;
receiving optical signals from a light source;
modulating the optical signals with the analog electrical signals to generate a corresponding plurality of optically modulated analog signals;
converting the plurality of optically modulated analog signals to a corresponding plurality of digital signals; and
processing the plurality of digital signals to generate the image.

The Office action states that Engeler's "modulation by laser light source 22 [uses] a prior digitization of the received ultrasound signal for an array of ultrasound elements" and cites Sumino 5, 9 and Aratama 28 in regards to direct electro-optical modulation. The Office Action further states that "this directly preserves the information waveshape of the pulse information for each element."

Although Applicant traverses the rejection, Applicant does agree with the statement that Engeler describes a digital approach. More specifically, Engeler describes using an optical modulator capable of

transmitting ultrasound signals to the imaging console with sufficient dynamic range and bandwidth.

Engeler states:

A digital approach is used in order to circumvent some of the problems currently limiting use of analog optical modulation, such as the limitation on the dynamic range of the transmitted signal due to the discrete nature of the light photons (Engeler, Fig. 2, column 3, lines 22-32).

Thus, Engeler's system teaches away from modulating optical signals with analog electrical signals.

As Applicant understands the Japanese language reference, based on the English Abstract and on the Figures, Sumino appears to describe an ultrasound embodiment wherein an ultrasonic wave reflected on the test piece is converted into an electric signal by the ultrasonic vibrator and transmitted by an electroptical converter and an optical fiber cable to a photoelectric converter and detector.

As Applicant As Applicant understands the Japanese language reference, based on the English Abstract and on the Figures, Aratama appears to describe an ultrasonic vibrator which converts the received ultrasonic echo to an electrical signal RE with is, in turn, subsequently converted to an optical signal P by an E-O (electroptical) converter to be input to an OE converter through an optical fiber cable.

Thus Sumino merely appears to describe an electro-optical converter that converts electrical signals to light signals and Aratama also simply describes an electro-optical converter that can convert an electrical signal to an optical signal. From the English abstracts, it is not clear where the modulation occurs but there is no teaching or suggestion that it occurs in the electro-optical converters. It is not clear to Applicant why or how the Engeler reference would be modified in the manner suggested by the Examiner or what is meant in the office action regarding "preserving the information waveshape." Applicant only can see that the Engeler reference advocates a digital approach, and Applicant notes that the Japanese abstracts do not reference waveshape preservation.

Accordingly, Applicant respectfully submits that the claims 1 and 10 (the only independent claims) as well as claims that depend therefrom, define allowable subject matter over the applied art.

Claims 5 and 6

With respect to claims 5 and 6, both these claims were rejected under 35 USC 103 (a) as being unpatentable over Engeler in view of Sumino or Aratama and further in view of Bartlett. Both claims 5 and 6 depend indirectly from independent claim 1. As discussed above, Engeler, Sumino, and Aratama are not believed to teach, suggest or disclose each and every element of independent claim 1. Consequently, claims 5 and 6 are believed to be patentable both by virtue of their dependency from an allowable base claim regardless of whether Barlett describes multiplexing.

Claims 3 and 7

Claim 3 was rejected under 35 USC 103(a) as being unpatentable over Engeler in view of Sumino or Aratama and further in view of Yakymyshyn, and claim 7 was rejected under 35 USC 103(a) as being unpatentable over Engeler in view of Sumino or Aratama and further in view of Silwa. Claims 3 and

7 depend directly or indirectly from claim 1. Engeler, Sumino, and Aratama are not believed to teach, suggest or disclose each and every element of independent claim 1. Consequently, claims 3 and 7 are believed to be patentable both by virtue of their dependency from an allowable base claim regardless of whether Yakymyshyn and Silwa recite specific materials or cooling techniques.

Summary

Applicant respectfully requests that a timely Notice of Allowance be issued in this case. Should the Examiner believe that anything further is needed to place the application in better condition for allowance, the Examiner is requested to contact Applicant's undersigned representative at the telephone number below.

Respectfully submitted,

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